Montana Wetland Rapid Assessment Method Guidebook (Version 2.0)

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Introduction

The purpose of this guidebook is to assist the field technician in accurately completing a rapid field assessment of wetland condition and to document the rapid assessment method.

Riparian and wetland areas provide some of the most productive natural resources found on private and public lands and play a significant role in providing habitat for aquatic life. In fact, riparian-wetland areas make up less than 4% of land surface in Montana but provide essential habitat for 60% of species identified as having the greatest conservation need (2005 Montana Comprehensive Fish and Game Conservation Strategy). Wetlands also provide important services such as maintaining water quality and moderating floods and are highly prized for their economic values and other uses such as livestock production and recreation.

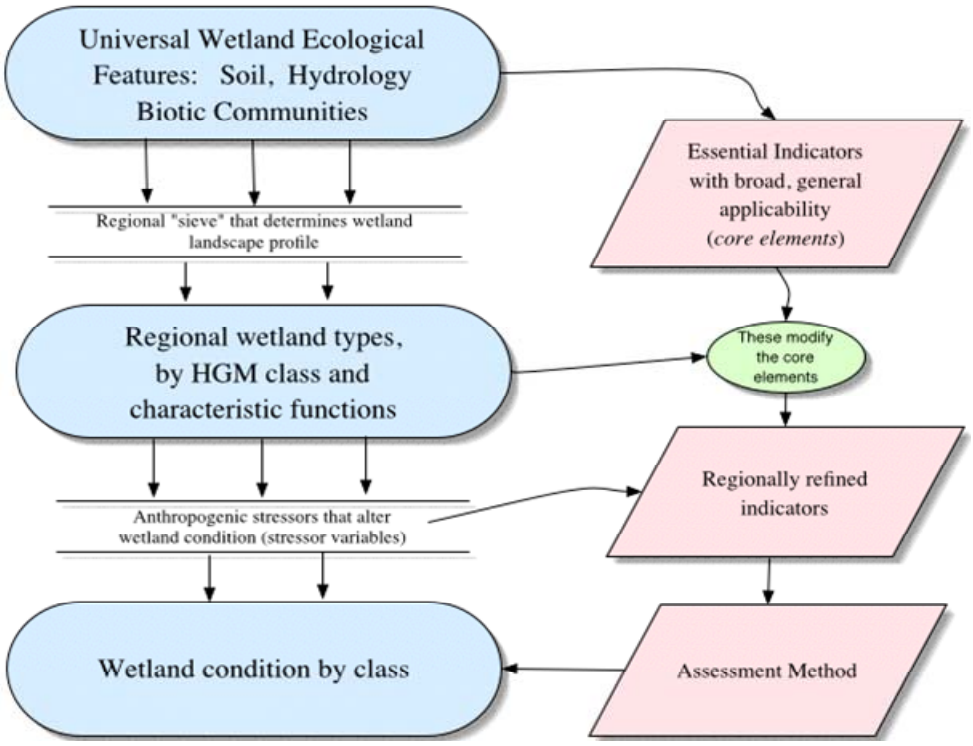
Montana has limited resources for assessing the condition of wetlands. Therefore, the State has developed a strategy that uses a tiered approach, which provides flexibility for using varying levels of effort to evaluate wetland conditions. This strategy includes three levels of assessment — landscape, rapid and intensive site assessments — to provide the data and information that are needed to help direct resources toward the protection and restoration of these important resources. The assessment of wetland condition through the use of Montana's wetland rapid assessment method is part of this strategy.

The development and testing of DEQ's wetland rapid assessment method began in 2004 (Fehringer 2005). Volunteers assisted DEQ by testing the form during the summer of 2005 (Montana Watercourse 2005). Our effort to further refine and improve the method is ongoing.

EPA Guidance
(from http://www.epa.gov/owow/wetlands/monitor/)

According to EPA (USEPA 2005) the development of wetland assessment methods, and in particular a wetland rapid assessment method, is a prerequisite to the accomplishment of state program objectives including reporting on wetland status and trends and identifying wetlands that need restoration and protection. Figure 1 shows a conceptual model that identifies the core indicators used in wetland assessment. The indicators and associated metrics reflect the ecological factors that define wetlands (e.g., hydrology, vegetation, soils and water quality) and how those factors respond to human-induced disturbance (i.e., stressors). EPA guidance asserts that the development of indicators for wetland assessment protocols can be based either on the response of a wetland to stressors (i.e., impacts) or on the stressors themselves.

Figure 1. Conceptual Model for Core Indicators.



From Fennessey et al. 2004

In particular, environmental indicators are used in making determinations of whether wetland function is changed or lost to the point where it affects wetland condition, causing degradation of wetland use (e.g., aquatic life use support, including wildlife habitat). The choice of indicators (and associated metrics) depends on the purpose of monitoring and level of accuracy needed for decision-making. Wetland indicators, and their associated metrics, are often portrayed in wetland rapid assessment methods as an organized set of assessment questions.

Table 1 presents three wetland assessment levels that can be used together to support program objectives. The selection of the appropriate level will depend on the availability of resources for project deployment and the desired level of rigor needed for project reporting and decision-making. The Montana wetland rapid assessment method is a Level 2 assessment.

Table 1. 3-Level Technical Approach.

3-Level Technical Approach

	Products/Applications
Level 1 - Landscape Assessment: Use GIS and remote sensing to gain a landscape view of watershed and wetland condition. Typical assessment indicators include wetland coverage (NWI), land use and land cover	•Status and trends •Targeting restoration and monitoring •Landscape condition assessment •Integrated reporting CWA 305(b)/303(d))
Level 2 – Rapid Wetland Assessment: Evaluate the general condition of individual wetlands using relatively simple field indicators. Assessment is often based on the characterization of stressors know to limit wetland functions e.g.,. road crossings, tile drainage, ditching.	•401/404 permit decisions •Integrated reporting •Watershed planning •Implementation monitoring of restoration projects, including nonpoint source BMPs and Farm Bill programs
Level 3 – Intensive Site Assessment Produce quantitative data with known certainty of wetland condition within an assessment area, used to refine rapid wetland assessment methods and diagnose the causes of wetland degradation. Assessment is typically accomplished using indices of biological integrity or hydrogeomorphic function.	•WQS refinement, including use designation • Integrated reporting •Compensatory mitigation performance standards •TMDL development & implementation •Verify levels 1 and 2 methods

From U.S. EPA Wetland Division 2005

According to the EPA, wetland assessments can be conducted with any of the three types of assessment methods, but should reflect clearly identified monitoring objectives. For example, rapid wetland assessments (Level 2) that are conducted using best professional judgment can be used to flag wetlands that need restoration or protection and the results can be verified using intensive-site assessment methods (Level 3). Also results from both Level 2 and Level 3 assessments can be used to enhance the utility or test the efficacy of landscape scale (Level 1) assessments. The three types of assessment are generally described as:

Level 1 - Landscape Assessment

Landscape level assessments rely almost entirely on Geographic Information Systems (GIS) and remote sensing data to obtain information about watershed conditions and the distribution and abundance of wetland types in the watershed. Wetland (acreage) trends analysis that is conducted by the U.S. Fish and Wildlife Service's National Wetland Inventory (NWI) is a Level 1 type of assessment.

Also, wetland landscape profiles and landscape development indices are used in "Level 1" assessments. Metrics used in these methods such as road density, percent forest cover, land use category, and presence of drainage ditches can provide preliminary information on wetland condition within a watershed. Field-based monitoring efforts (Level 2 and 3) can be targeted within parts of a watershed and to specific wetlands in need of more rigorous assessment.

Level 2 - Rapid Assessment
Rapid assessments use relatively simple metrics for collecting data at specific wetland sites. These methods generally provide a single rating or score that shows where a wetland falls on the continuum ranging from full ecological integrity (or least impacted condition) to highly degraded (poor condition).

A "rapid" method should take two people no more than four hours of field time, and one half day of office preparation and data analysis to reach a condition score. Once verified with "Level 3" site intensive assessments, rapid assessment methods can be used for regulatory decision-making, local land and water use planning, and the assessment of ambient wetland condition.

Level 3 - Intensive Site Assessment
Intensive-site assessments provide higher resolution information on the condition of wetlands within an assessment area. Wetland bioassessment procedures are often developed and used in this type of assessment, as are HGM functional assessment methods.

The robust metrics used in "Level 3" assessments produce information that can be used to refine rapid assessment methods based on a characterization of reference condition, diagnose the causes of wetland degradation, develop design and performance standards for wetland restoration, including compensatory wetland mitigation, and support the promulgation of water quality standards that are protective of wetlands.

Montana's Wetland Rapid Assessment Method

The Montana wetland rapid assessment method is intended for use by trained field technicians for rapidly assessing the ecological integrity (condition) of a wetland. It is a field-based screening level assessment tool that is used to help identify and prioritize wetlands within a watershed or region for protection and restoration. There are three major assessment components to this form: impacts, stressors and restorability. Trained technicians and professionals should assess wetland impacts, stressors and restorability. Volunteers or individuals with limited training are encouraged to use the form to assess wetlands stressors and restorability. However, adequate training is required to assess wetland impacts.

A number of similar or associated wetland assessment tools have been developed and used in Montana. Generally, each method has a specific purpose and provides slightly different interpretations and types of information. For example, the Montana Department of Transportation (MDT) Wetland Assessment Method (Berglund 1999) was designed to evaluate functions and values in order to mitigate impacts from highways, while the Montana Natural Resource Conservation Service Riparian Assessment form (NRCS 2004) was designed to assess stream channel stability and riparian area sustainability. The BLM also has a form for assessing lotic (BLM 1998) and lentic (BLM 1994) riparian and wetland areas to determine if wetlands are functioning properly. The DEQ form includes wetland characterization and questions that were derived from the MDT, NRCS

and BLM forms. However, the primary purpose of the DEQ form is to assess the ecological integrity (wetland condition), identify potential stressors, and to rank restorability.

DEQ's wetland rapid assessment form was designed to be consistent with how DEQ conducts stream reach assessments through using the NRCS riparian assessment form. Therefore this assessment was designed so that a proper functioning condition could be estimated for riverine sites by extracting the NRCS riparian assessment questions from the Montana wetland rapid assessment and adjusting the scores. The Montana wetland rapid assessment was also designed so that the data could be easily stored in a Personal Data Assistant (PDA) and downloaded to an ACCESS database where the information could be retrieved for future watershed planning purposes.

What the assessment will and will not tell you

The Montana wetland rapid assessment method is designed as a "first cut" field evaluation to assess wetland condition, potential stressors and restorability. The method should be used as a field-based flagging tool that is combined with a landscape level assessment (Level-1) to help identify and prioritize wetlands within a watershed or region that need additional protection or restoration.

The assessment is not intended to give the user quantitative or diagnostic analysis of wetland condition. If this is desired, the problems identified using this method should be further evaluated using more specific site-intensive (level-3) assessment techniques. The ratings used in this form are not intended to be an absolute value for determining wetland impairment status or for diagnosing the cause of impairment. Rather, the appropriate use of these ratings is to help managers identify wetlands within a given region that are at risk.

Assessing Wetland Impacts and Stressors

The rapid assessment form uses indicators to assess wetland impacts that generally reflect a decline in ecological integrity (wetland condition) and are usually the result of human-caused activity. For example, indicators within the form that are used to assess riparian/wetland impacts include: bank stability, algae growth, browse condition and abundance of noxious weeds. Indicators that are used to assess the degree of wetland stress that occurs within the buffer include the evaluation of human-caused activities such as: grazing, clear cutting, roads and residential development. Indicators of wetland stress also include *impacts* that occur within the buffer area surrounding the wetland (e.g., saline seeps, noxious weeds and human-caused bare ground) since these types of impacts often threaten the adjacent wetland.

Using the Ratings

The presence of a stressor does not always signify that the wetland is impacted. For example, grazing activity (stressor) within the wetland or wetland buffer area does not

automatically mean that the wetland is being heavily browsed, has excessive nutrients, or is being trampled. For this reason, the observer records the scoring of wetland impacts and stressors on the form separately, in addition to providing an overall score. The "overall score" that the observer records, combines the stressor and impact scores and is used to flag wetlands that are at risk. The final assessment requires a professional to review the form and photographs to determine if the wetland is likely to be impacted and if any of the stressors that were observed are a probable cause of the wetland impacts that were recorded.

General Instructions

Determining the Wetland Assessment Unit Area

The wetland rapid assessment form was designed for the evaluation of a relatively small wetland assessment unit. The assessment unit generally includes standing water < 6.6 feet deep, and the wetland vegetation, which can usually be distinguished from terrestrial vegetation by a major change in vegetation communities and soils/landform (delineating jurisdictional wetlands is not required). For example, rush/sedge communities and organic soils often abruptly change to upland grasslands and mineralized soils at the edge of a wetland where there is less water available.

Below are the criteria for determining the size of the wetland assessment units.

1. For wetlands smaller than 100^2 meters include the entire wetland in the assessment area.
2. For wetlands larger than 100^2 meters only include a randomly selected 100^2 meter sub-sample as the wetland assessment area.
3. Where wetlands are contiguous with **standing** non-wetland water bodies (lakes, ponds):
    a. If wetland area has < 100^2 meters open water, include all open water in the assessment area.
    b. If wetlands are contiguous with > 100^2 meters open water (e.g. Flathead Lake), include open water in the assessment area to an estimated deep water line (6.6 feet).
4. Where wetlands are contiguous with **flowing** non-wetland waterbodies (rivers, streams, irrigation canals):
    a. The length of the assessment unit is 100 meters for nonperennial and upper perennial streams (1^{st} and 2^{nd} order streams) and 200 meters for lower perennial streams and rivers (3^{rd} order and larger).
    b. The width of the assessment unit is to the outer most stream meanders.
    c. For fringe wetlands (cumulative width along both banks <3X bankfull channel width) adjacent to a channel with a bankfull width > 150 feet (e.g. Missouri River) do not include the channel in the assessment unit. For nonfringe wetlands (cumulative width along both banks > 3X bankfull channel width) or those fringe wetlands adjacent to a channel with a bankfull width < 150 feet (e.g. Little Blackfoot River) include the entire channel in the assessment area.
    Note: In this case, fringe and nonfringe wetlands are defined as riparian areas and floodplains that are adjacent to the stream channel.

Wetland Characterization (Classification, Photos and Site Map)

Wetland characterization is an important component of this form that is useful for a variety of purposes. For example, the observation information can be used to help inventory the locations of amphibian and aquatic reptile populations and habitats, and

threatened and endangered species. The wetland classification can be used to describe the wetland types that are being assessed, to ground truth wetland mapping and for identifying unique wetland types. This form classifies wetlands by using hydrogeomorphic (HGM) wetland classes (Brinson. 1993) and a classification hierarchy showing systems, subsystems, and classes from Cowardin et al. (1979). The photos and site maps are useful for reviewing the wetland rapid assessment ratings and will provide a baseline for any future assessment of the wetland.

Wetland Rapid Condition Assessment

At first glance the wetland rapid assessment form appears very complex. However it really is not. The first three pages of the form are used for site characterization and wetland classification. The actual wetland rapid assessment does not start until after the wetland site map is filled out. Once a technician becomes familiar with the form, the assessment usually takes less than 30 minutes to fill out in the field. The assessment includes four major components:

1) The assessment of wetland impacts
    a) Assessment of hydrogeomorphology condition
    b) Assessment of vegetation condition
    c) Assessment of water quality condition
2) The assessment of wetland stressors (buffer condition)
    a) Stressors that occur in adjacent area surrounding the wetland
3) The assessment of wetland restorability
4) Summary of ratings and overall score

The form was designed to accommodate all wetland types. Therefore, several sections of the form are only filled out for a specified wetland type. These sections include:

1) ***Hydrogeomorphology Condition – Riverine:*** The wetland must be an HGM riverine type.
2) ***Vegetation Condition – Shrubs:*** The wetland must have the potential for woody vegetation
3) ***Water Quality Condition:*** The wetland must have a standing water component that can be evaluated.

The site location information (on the first page) is usually filled out in the office. The ratings for hydrogeomorphic, vegetation, water quality and buffer condition index scores and the wetland impact and overall scores (on the last page) do not need to be filled out in the field. These data fields will be automatically calculated when the data are entered into the database.

The most difficult part of this form is assessing the riverine hydrogeomorphic characteristics and identifying the vegetation. These assessments require adequate training in hydrology and plant identification. We have included additional information within the appendices and attachments to help with these assessments. However, adequate training and experience is needed to fill out these portions of the form satisfactorily.

Understanding Potential and Capability

Each site must be evaluated with respect to its own potential or capability.

Potential, as used here, is considered to be the highest ecological integrity possible, without significant human interference. The assessor should have a good understanding of the ecological potential of the wetland sites that they are assessing since the potential of a site can vary depending on limitations from natural features such as soils, hydrology and climate. These natural limiting factors are taken into account when evaluating a wetland based on potential.

Capability is the highest ecological integrity possible for a site given limitations caused by political, social or economic restraints. Dams, highways, railroads, or changes in hydrology as a result of some watershed activity, such as urban development that cannot be easily addressed, are often limiting factors. These human-caused limiting factors are taken into account when evaluating a wetland based on its capability.

Evaluating Wetland Restorability

This wetland rapid assessment method includes an evaluation to describe how easily the wetland can be restored and if the wetland condition appears to be improving or trending downwards. This information will be entered into the database so that is can be used by resource managers to help prioritize wetland protection and restoration efforts.

Filling out the Form

The first part of the form (page 1) includes site identification, general site description, and photos. The site identification information is usually filled out in the office before conducting the assessment. The location information is filled out prior to going into the field and is used by the assessor to navigate to the wetland.

For Site ID Code: Record the unique site code for the wetland being assessed. DEQ's Data Management Section assigns a code for STORET data management purposes (to be developed). Otherwise, a project code is used if the data are collected as part of a larger project (e.g., amphibian surveys).
Site Name: Record the name of the site. If the site does not have a name assign one such as Wetland #1 @ FDR Ranch.
HUC 4th/5th Code and name: provide the Hydrologic Unit Codes for the subbasin and watershed where the wetland is located. This information can be found at http://maps2.nris.state.mt.us/mapper/ .
Determining Location of site using GPS: The location of the wetland site that will be assessed needs to be determined before going into the field by using a topographic map, which can be found at http://maps2.nris.state.mt.us/mapper/. The topographic maps use NAD27 datum to determine UTM coordinates, which are needed to navigate to the wetland sites using a GPS unit. Below is the rationale for using the correct datum and coordinates:

I marked a site on my GPS in the field. When I got back home to find it on the topographic map, I noticed something was not right. Using the UTM coordinates from the GPS, I located the site on the topographic map. But the map site and the site I checked in the field did not match. I then remembered about map datums. The topographic map was made to NAD27, while my GPS was set to NAD83. After changing the GPS to the NAD27 datum, all was fine. So the moral of this story is: MAKE SURE THE GPS DATUM AND THE MAP DATUM MATCH!!!

Our STORET database also requires that the location of the wetland site be recorded in Datum NAD83 as Lat/Longs in decimal-degree. Please use your GPS to determine this location when you are in the field.

Person Assessing Wetland: Record the name(s) of the people conducting the assessment.
Date of Site Visit: Record the date of the assessment of the site.
Affiliation(s): Record the organization to which the assessor(s) belongs. Include contact information.
General Site Description: Record any directions or location information that would help the next person find the site. Please also use this as an opportunity to explain your overall impression of the site. Walk around the site. Include any outstanding populations of invasive of noxious species and the vegetation communities that characterize the site. Please note any wildlife that were observed either directly or indirectly through scat or footprints.

Photo Documentation: It is important to take photographs to document the site characteristics and any impacts. Please record the photo number, describe the direction that the photo was taken and provide a description of what is in the photo. Also document the locations of the photos on the site map (Section 2.6).

Wetland Classification (Form Section 1.0)

Natural, Altered or Completely Altered Wetland Types (Form Section 1.1)

Circle 'natural wetland type' or 'altered wetland type' or "completely altered" to the point where there are no wetland characteristics. Use potential to assess the natural wetland types. Use capability to assess the altered wetland types. Do not assess the completely altered sites.

Natural wetlands are assessed in respect to the potential for the site. For example, if the wetland is a natural riverine wetland type then circle riverine in section 1.2 and "Natural wetland type" in section 1.1.

Capability is used to assess a wetland when the wetland HGM Class has been hydrologically changed by a human-caused alteration (e.g., man-made dam). For example, if the wetland was once a riverine HGM class and is now a lacustrine fringe HGM class due to damming, then circle "lacustrine fringe" in section 1.2 and "altered wetland type" in section 1.1, and describe the alteration (e.g., dam).

Completely altered wetlands are historic wetlands that no longer have wetland characteristics due to a human caused alteration (e.g., filling, draining or converting a wetland to a water tank). If you circled "completely altered" then describe the alteration (e.g., water tank) and do not fill out the remainder of the form – the wetland receives a score of zero.

HGM Classification (Form Section 1.2)
(from: Technical Report WRP-DE-4)

The HGM Classification relies on geomorphic, physical and chemical descriptors that place emphasis on hydrologic and geomorphic controls that are responsible for maintaining the functional aspects of wetland ecosystems (Brinson 1993). The approach places emphasis on the importance of abiotic features of wetlands for such functions as the chemical characteristics of water, habitat maintenance, and water storage and transport.

In Section 1.2 five HGM wetland classes are listed with their appropriate subclasses; choose a class and subclass (unless there are no subclasses) that best fits the particular site based on the definitions below. Circle your choice on the form. Table 2 provides characteristics and examples for each HGM wetland class.

Table 2. Hydrogeomorphic Classes of Wetlands Showing Associated Dominant Water Sources, Hydrodynamics, and Examples of Subclasses.

Hydrogeomorphic class	Dominant water Source	Dominant hydrodynamics	Examples of subclass Eastern USA	Examples of subclass Western USA
Riverine	Overbank flow from channel	Unidirectional, horizontal	Bottomland hardwood forests	Riparian forests
Depressional	Return flow from groundwater and interflow	Vertical	Prairie potholes marshes	vernal pools Prairie Potholes
Slope	Return flow from groundwater	unidirectional, horizontal	Fens	Montane seeps, fens, springs, wet meadows
Flats (mineral soil)	Precipitation	Vertical	Wet pine flatwoods	Playas
Flats (organic soil)	Precipitation	Vertical	Everglades	Peat bogs, portions of peat bogs (Bogs rare/do not occur in Montana)
Fringe (Lacustrine)	Overbank flow from lake	Bidirectional, horizontal	Great Lakes marshes	Flathead Lake marshes

Table adapted from Burkhardt, 1996: http://www.wetlands.com/coe/fr16au96.htm

Class: Riverine

Riverine wetlands are floodplains and riparian corridors that are associated with stream channels. Dominant water sources are overbank flow from the channel or subsurface hydraulic connections between the stream channel and wetlands. Wetland subclasses include upper perennial, lower perennial and nonperennial. The HGM Riverine subclasses are the same as in the Cowardin classification. However, the Cowardin riverine system is only referring to the stream channel whereas the HGM classification includes the entire riverine wetland complex (stream channel, riparian area and floodplain).

Subclasses:

Upper Perennial: The upper-most, smallest stream in a tributary system often stream orders one or two. Upper perennial wetlands usually have high gradient channels, fast flow, and coarse substrates (bed materials) of sand, gravel, or boulders. (Same as "Upper Perennial" in the Cowardin classification)

Lower Perennial: A larger stream, typically at lower elevation (larger stream order). Lower perennial wetlands usually have low velocity flows and fine substrates. (Same as "Lower Perennial" in the Cowardin classification)

Non Perennial, Intermittent or Ephemeral: A stream where flowing water is only present part of the year. Water either flows briefly, in direct response to precipitation in the immediate vicinity and the channel is above the water table (ephemeral), or surface water does not flow continuously, as when water losses from evaporation or seepage exceed the available stream flow (intermittent). (Similar to "Intermittent" in the Cowardin classification).

Class: Depressional

Depressional wetlands include landforms such as potholes and vernal pools. Because they frequently occur high in drainages, they are typically more dependant on atmospheric exchanges than other wetland types. In dry climates, depressions are either dry much of the time, as in vernal pools, or they are dependant on groundwater sources. There are often strong seasonal fluctuations in water table because of the seasonality of the ratio of precipitation to potential evaporation.

Subclasses:

Closed Depressional: Topographic depression closed without discernable surface water inlets, outlets, or other hydrological connections.

Open Groundwater Depressional: Primary source of water is groundwater. Usually has small watershed / wetland area ratio.

Open Surface water Depressional: Primary source of water is precipitation, overland flow or interflow.

Figures 2 and 3 provide examples of depressional wetlands (Brinson 1993).

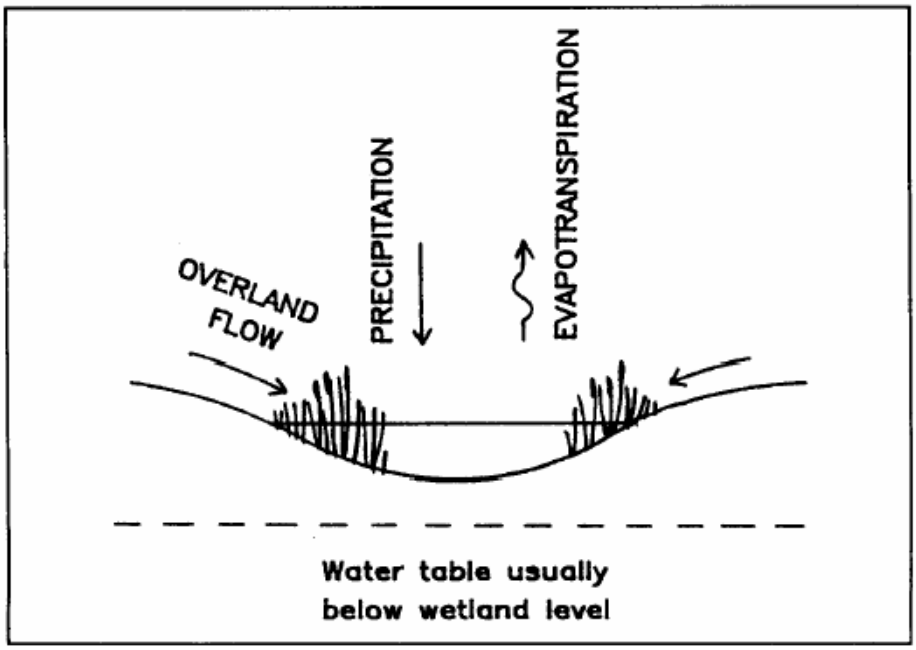


Figure 2. Surface Water Depression

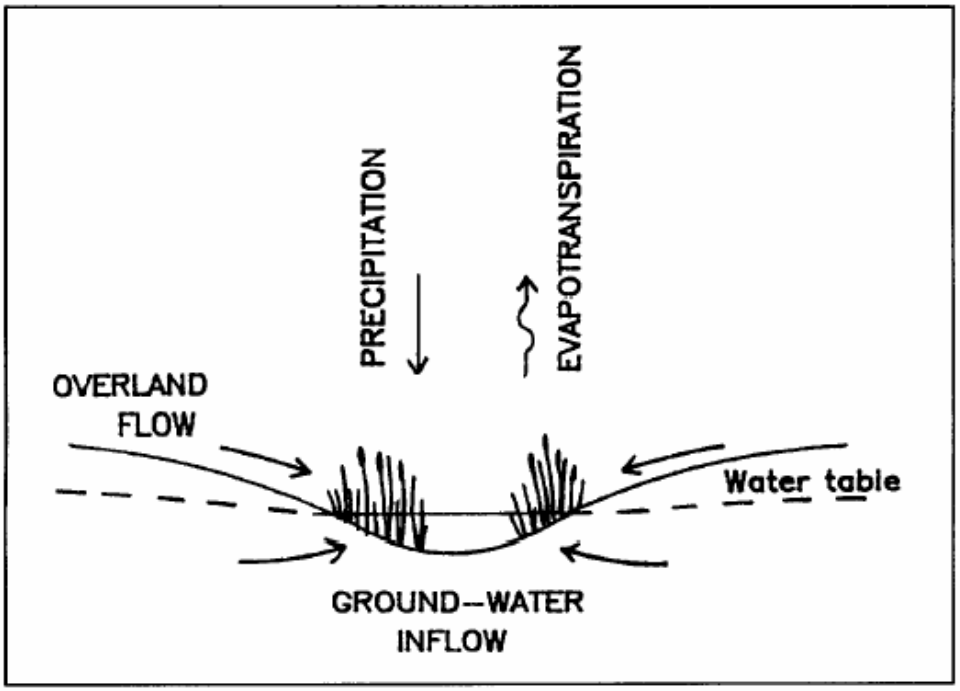


Figure 3. Groundwater Depression

Class: Slope

Slope wetlands normally are found where there is a discharge of groundwater to the land surface. They normally occur on sloping land; elevation gradients may range from steep hillsides to slight slopes. Slope wetlands are usually incapable of depressional storage because they lack the necessary closed contours. Principal water sources are usually groundwater return flow and interflow from surrounding uplands as well as precipitation.

Subclasses:

Open Spring: A slope wetland receiving water from a groundwater spring, but not accumulating organic soil. An open water spring will have a small amount of water pooling around the spring, but the water will still flow downhill from an outlet in the pool. These wetlands are important amphibian habitats.

Riverine Spring: A spring where no water accumulates, but simply flows downhill from the water source.

Fen: A peat-accumulated wetland that receives some drainage from surrounding mineral soil and groundwater and usually supports marsh-like vegetation**.** The wetland has more than 20 cm of organic layer. Wetland feels bouncy.

Wet Meadow: A relatively topographically flat area with lush vegetation where groundwater comes to the surface. There usually is not very much standing water, but water is near the surface.

Figure 4 provides an example of a slope wetland (Brinson 1993).

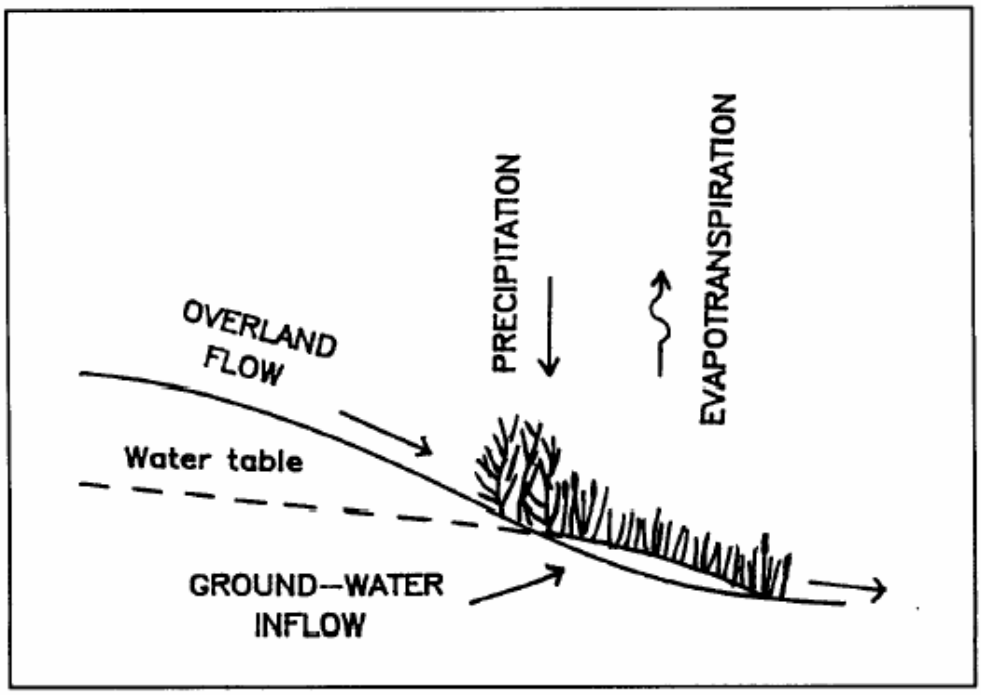


Figure 4. Groundwater Slope

Class: Mineral Soils Flat
Wetland is topographically flat and has precipitation as a dominant source of water. Soils are mineral.

Subclass
Playa: In the Great Plains playas are defined as relatively *large* shallow depressional recharge wetlands (often called playa lakes) that are formed through a combination of, wave, and dissolution processes with each wetland existing in its own watershed. As the words depressional and recharge imply, Great Plains playas only receive water from precipitation and runoff. Naturally water is only lost through evaporation, transpiration, and recharge. Wetlands in the Great Plains that have springs, are influenced by streams or receive groundwater additions to their surface water are generally not considered to be playas. Because playa watersheds are not connected to one another and storms can be very localized in the Great Plains, a playa in one location may be full of water while only a short distance away other playas are dry. Playas are shallow, usually only 5 feet deep at most, and have erratic hydroperiods, frequently drying and filling with water in most years.

Cowardin Classification System (Form Section 1.3)
(from: http://wetlands.fws.gov/Pubs_Reports/Class_Manual/class_titlepg.htm)

This classification has been used by the USFWS to inventory wetlands and deepwater habitats of the United States (Cowardin et al. 1979). It is intended to describe ecological taxa, arrange them in a system useful to resource managers, furnish units for mapping, and provide uniformity of concepts and terms. Wetlands are defined by plants (hydrophytes), soils (hydric soils), and frequency of flooding. Ecologically related areas of deep water, traditionally not considered wetlands, are included in the classification as deepwater habitats.

Systems form the highest level of the classification hierarchy; Three are defined for wetlands in Montana – Riverine, Lacustrine, and Palustrine. The Riverine System has four Subsystems; the Lacustrine has two, Littoral and Limnetic; and the Palustrine has no Subsystems.

Within the Subsystems, Classes are based on substrate material and flooding regime, or on vegetative life form. The same Classes may appear under one or more of the Systems or Subsystems. Six Classes are based on substrate and flooding regime: (1) Rock Bottom with a substrate of bedrock, boulders, or stones; (2) Unconsolidated Bottom with a substrate of cobbles, gravel, sand, mud, or organic material; (3) Rocky Shore with the same substrates as Rock Bottom; (4) Unconsolidated Shore with the same substrates as Unconsolidated Bottom; (5) Streambed with any of the substrates; and (6) Reef with a substrate composed of the living and dead remains of invertebrates (corals, mollusks, or worms). The bottom Classes, (1) and (2) above, are flooded all or most of the time and the shore Classes, (3) and (4), are exposed most of the time. The Class Streambed is restricted to channels of intermittent streams and tidal channels that are dewatered at low tide. The life form of the dominant vegetation defines the five Classes based on vegetative form: (1) Aquatic Bed, dominated by plants that grow principally on or below the surface of the water; (2) Moss-Lichen Wetland, dominated by mosses or lichens; (3) Emergent Wetland, dominated by emergent herbaceous angiosperms; (4) Scrub-Shrub Wetland, dominated by shrubs or small trees; and (5) Forested Wetland, dominated by large trees.

Modifying terms applied to the Classes or Subclasses are essential for use of the system. In nontidal areas, eight Regimes are used: permanently flooded, intermittently exposed, semipermanently flooded, seasonally flooded, saturated, temporarily flooded, intermittently flooded, and artificially flooded. Special modifiers are used where appropriate: excavated, impounded, diked, partly drained, farmed, and artificial.

Within the form:

(1) Choose a system (there may be more than one system)
(2) (move right) choose a subsystem,
(3) Divide the wetland into different wetland classes (similar to dividing a pie into pieces)
(4) Choose a water regime for each class (described on the right side of the form)
(5) When appropriate choose a modifier for each class
(6) Write in the percent coverage of each class. Choose the percentage of each modifier as if the wetland were being classified using an aerial photograph. For example, only select the modifier aquatic bed if it overlies an unconsolidated bottom (the total should add up to 100%).

System: Riverine

Riverine wetlands are an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water (Figure 5).

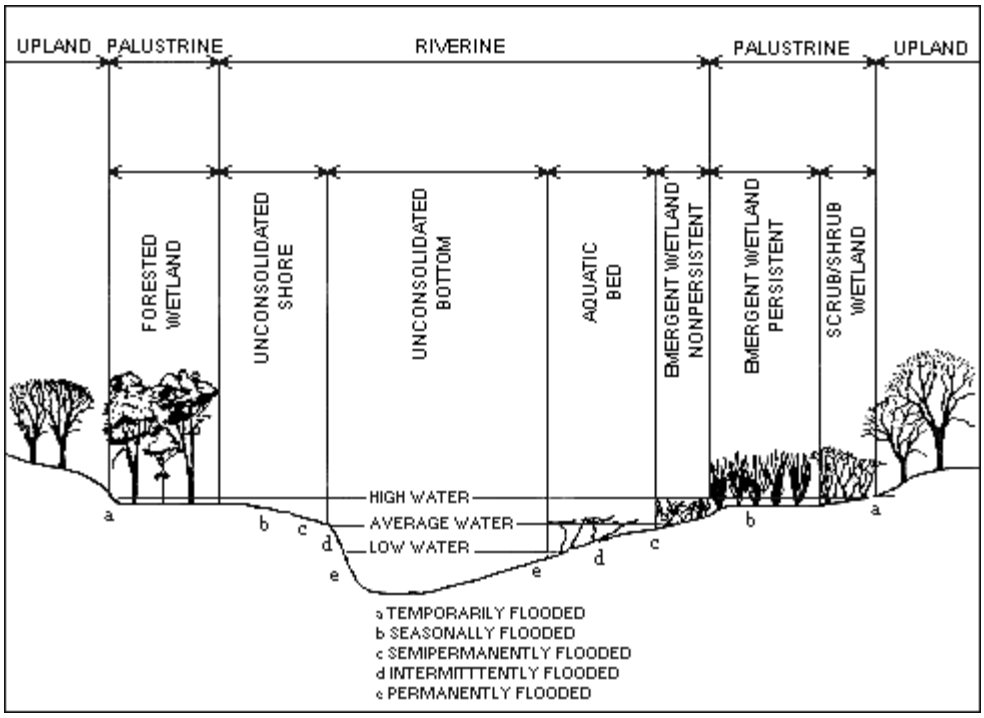


Figure 5. Distinguishing Features and Examples of Habitats in the Riverine System (Cowardin et al. 1979).

Subsystems:

Upper Perennial: The upper-most, smallest stream in a tributary system. Upper perennial wetlands usually have high gradient channels, fast flow, and coarse substrates of sand, gravel, or boulders. (Also see HGM description in section 1.2)

***Lower Perennial*:** A larger stream, typically at lower elevation. Lower perennial wetlands usually have low velocity flows and fine substrates. (Also see HGM description in section 1.2)

Intermittent: Surface water does not flow continuously, as when water losses from evaporation or seepage exceed the available stream flow. (Also see HGM description in section 1.2)

System: Lacustrine

Lacustrine systems include deepwater lentic habitats (static or standing, non-flowing waters such as lakes or reservoirs) or large lentic wetlands without trees or shrubs, persistent emergent vegetation, or emergent mosses or lichens (Figure 6).

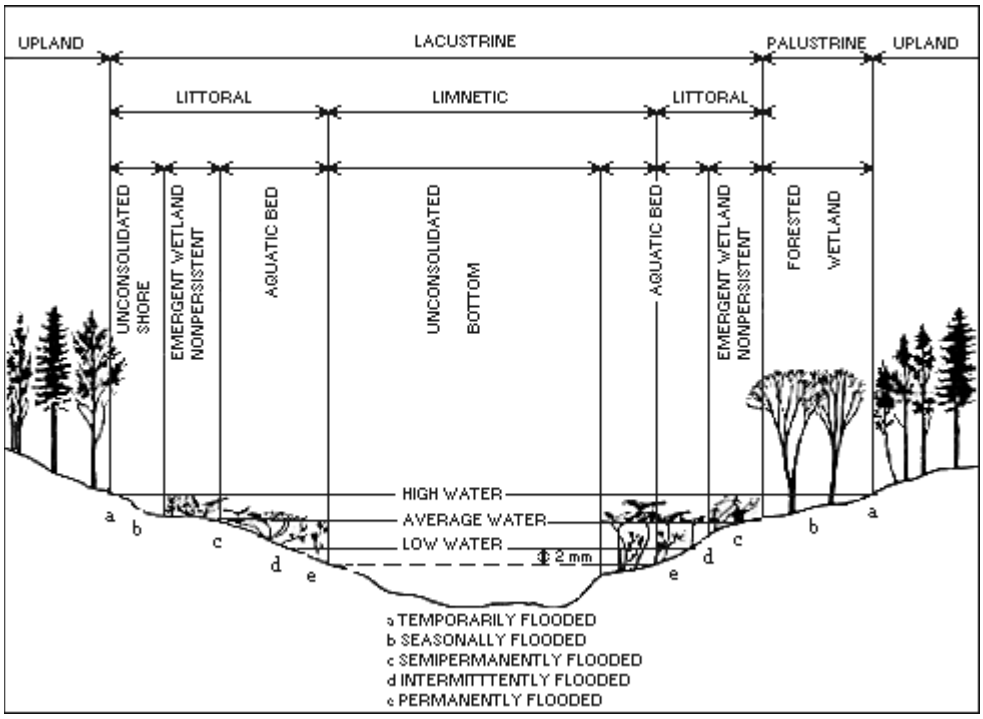


Figure 6. Distinguishing features and examples of habitats in the Lacustrine System (Cowardin et al. 1979).

Subsystems:

Limnetic: Limnetic subsystems are all deepwater habitats within the lacustrine system that are greater than 2 m (6.6 feet) deep. Many small lacustrine systems do not have limnetic subsystems. Wetland rapid assessments are not used to assess the limnetic zone (deep water habitats).

Littoral: All wetland habitats in the Lacustrine System are littoral. Littoral subsystems extend from the shoreward boundary of the system to a maximum depth of 2 m (6.6 feet) below low water or to the maximum extent of nonpersistent emergents, if these grow at depths greater than 2 m. These littoral wetlands are found along the borders of lakes, often in sheltered areas such as bays. They occupy the portion of the lake from the shore outward to a depth where rooted plants can no longer grow.

System: Palustrine

Palustrine systems include all wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens (Figure 7). It also includes wetlands lacking such vegetation, but with all of the following four characteristics: (1) area less than 8 ha (20 acres); (2) active wave-formed or bedrock shoreline features lacking; (3) water depth in the deepest part of basin less than 2 m at low water.

(No Subclass)

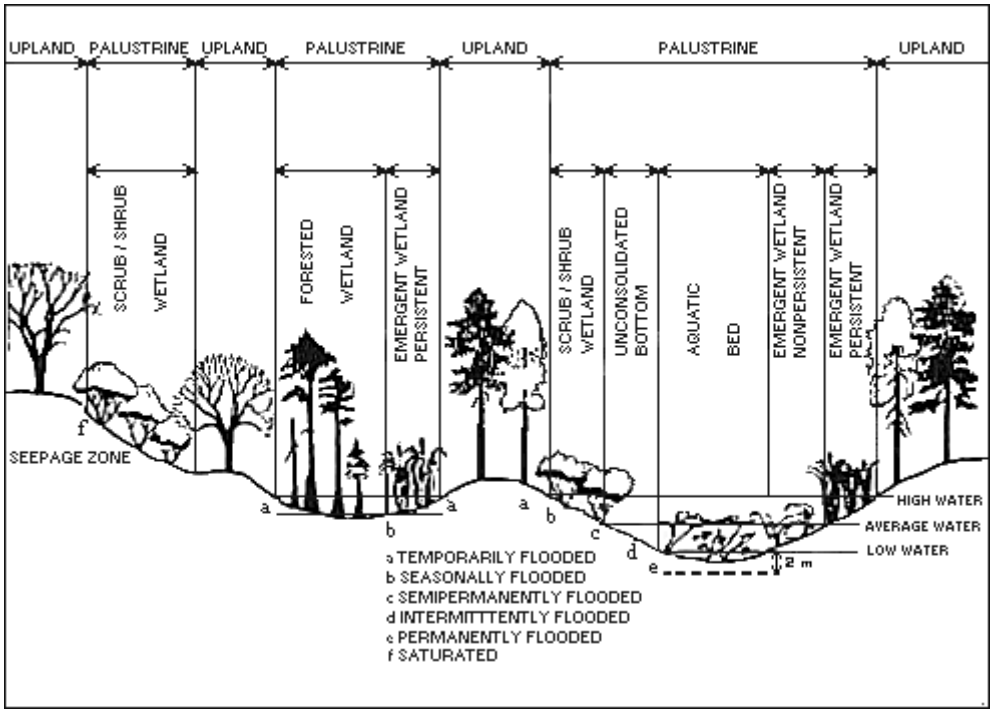


Figure 7. Distinguishing features and examples of habitats in the Palustrine System (Cowardin et al. 1979).

Classes

Circle all of the classes present. Classes are not unique to systems or subsystems, although not all classes occur in each.

Rocky Bottom-Substrate of bedrock, boulders, rubble, or combinations of these covering 70% or more of the habitat
Unconsolidated Bottom-Substrate of organic material, mud, sand, gravel, or cobbles with less than 70% area cover of bedrock, boulders, or rubble
Aquatic Bed- Vegetation tidally-submerged or permanently-flooded. Plants typically grow on or below water surface (e.g., algae, rooted, or floating-vegetation).
Emergent Wetland- During most years, vegetation is composed largely of non-persistent perennials that dominate the substrate or flooded wetland habitat.
Rocky Shore- Substrate of organic material, mud, sand, gravel, or cobbles with more than 70% area cover of bedrock, boulders, or rubble.
Unconsolidated Shore- Substrate of organic material, mud, sand, gravel, or cobbles with less than 70% areal cover of bedrock, boulders, or rubble. Less than 30% areal cover of vegetation other than pioneering plants.
Moss-Lichen Wetland Class-Wetland where mosses or lichens cover substrates other than rock and where emergents, shrubs, or trees make up less than 30% of area cover.
Scrub-Shrub Class- Vegetated wetland dominated by woody vegetation less than 20 feet tall. Species include shrubs, young trees, and stunted trees and shrubs.
Forested Wetland Class- Vegetated wetland characterized by woody vegetation that is 20 feet tall or taller.

Water Regime

Write in water regime abbreviation (displayed along right hand margin). The water regime is a description of the amount of water that is in the wetland over the course of a year or several years. Observe the current amount of water and consider seasonal changes (e.g., climate, weather, and the likely occurrence of hydrologic events such as flooding). Revisiting the site several times during different seasons would offer a more conclusive answer, but do the best you can. The water regime is important to record for depressional wetlands (see HGM classification in section 1.2).

Temporarily Flooded: Surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season. Plants that grow both in uplands and wetlands are characteristic of the temporarily flooded regime.
Seasonally Flooded: Surface water is present for extended periods especially early in the growing season, but is absent by the end of the season in most years.
Semi permanently Flooded: Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.

Intermittently Exposed: Surface water is present throughout the year except in years of extreme drought.
Permanently Flooded: Water covers the land surface throughout the year in all years. Vegetation is composed of obligate hydrophytes.
Saturated: The substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present.

Modifiers

Write in Modifier Abbreviation (displayed along right hand margin). Modifiers may provide information on hydrology, water chemistry, pH, and soil needed to clearly describe the characteristics of wetlands. This question is used to describe wetlands partially drained by artificial surface outlets, created by human excavation or impoundment, created by beaver, etc. When appropriate, write the letter of the modifier as listed in the pick list in the correlating box. More than one modifier may be identified.

Percent

Write in an approximate percent coverage of each wetland class within the wetland. These percentages should add up to 100 percent of the wetland area within the wetland assessment unit.

Site Characterization (Form Section 2.0)

2.1 ***Are Fish Present?*** Check "Yes" if fish are observed. If so, please describe the observation. Check "No" if no fish are observed and it is obvious that the habitat for fish is not provided (water is too shallow, no cobble substrates for spawning, etc.), or "Not Sure" if fish may be present (there is sufficient habitat) but they were not directly observed.

2.2 ***Any Amphibian and Aquatic Reptile Species observed?*** Check "No" if not observed. If amphibian and aquatic reptile species were observed check the species identified and the life stage observed (eggs, tadpole or adult). If species cannot be identified than Check "species not known" and briefly describe what was observed. Please use the book: "Amphibian and Reptiles of Montana" (Werner et. al. 2004) to help identify the amphibian and aquatic reptile species. The photo key (Attachment A) also provides photos that are useful for identifying amphibians and reptiles.

2.3 ***Percent of Standing Water:*** Circle the percent of different water depths that are observed. Assessing the percent of standing water provides information that is useful for assessing the site potential for providing amphibian habitat. Estimate the amount of standing water and depth to the best of your ability. It is not necessary to be extremely precise.

2.4 ***Was evidence of an endangered species observed?*** Check "No" if no species were observed and if they were, check next to species observed and briefly describe your observation in the bottom row. Provided is a list of endangered and threatened species that are listed by the region in which they may appear. Please check the box for the species that were observed. A valid species observation could be an actual citing of the animal or evidence of their presence such as: a nest, scat, tracks, etc. Please use the bottom portion of the table to describe what was observed.

2.5 ***Site Map for Wetland Assessment Form:*** Draw to scale a brief sketch of the Wetland Site. Fill in the grid scale in the space provided above the grid and the total size of the wetland in the space provided below the grid. The site map provides an opportunity to describe characteristics of the wetland site. The legend should guide you in including everything crucial to the site. Please document where photos were taken and describe any other prominent features of the site: litter, damming, etc. Labeling on the map is encouraged even when using the symbols suggested by the legend. Be sure to note the overall size of the wetland assessment area (length x width) below the site map grid.
Note: A high-resolution aerial photograph can be used instead of the site map.

2.6 ***Emergent Vegetation:*** Estimate the coverage of each type of emergent listed and circle the approximate percent of surface area.

Hydrogeomorphology Condition (Form Section 3.0)

Hydrogeomorphology is a term that is used to describe the source of the water (e.g., surface runoff or groundwater) and the physical setting of the wetland (e.g. riverine, depressional, lacustrine, etc.) Hydrology is the most important category to assess. If the hydrology is altered, the vegetation community and aquatic life that depend on the wetland will be affected. Hydrologic impacts include excavation, impoundments, dikes, draining, diverting and activities that caused compaction and accelerated erosion.

The following categories are used in the form to describe the hydrogeomorphic condition:

Non-Occurring or Slight: None of the area is impacted. Impacts are infrequent or sporadic within the wetland area. Less than 15% of concerned area is affected.
Moderate: Impacts are obvious. 15-60% of concerned area is affected.
Severe: Impacts are extreme. Usually 60% or greater of the concerned area is affected.

3.1 ***The degree of wetland surface or subsurface flow (groundwater) patterns that have been negatively altered by human disturbance*** is important for identifying hydrologic impacts to the site. Consider any culverts, past excavation of the land, or construction that alters stream or wetland flow. For example, a ditch or cattle watering tank within the buffer area may indicate that water is being diverted from the wetland. Do not include hydrologic alterations that were conducted to create or enhance the wetland.
3.2 ***Degree of habitat negatively altered by addition or withdrawal from irrigation, livestock watering, etc.*** Consider any impacts from abnormal excessive fluctuating water levels. Also, if there are any structures used to create or enhance the wetland evaluate whether they accommodate safe passage of flow (e.g., no head cuts affecting dam or spillway).
3.3 ***Dredging or Filling*** is often apparent when large mounds of exposed soil have affected the hydrology and vegetation.
3.4 ***Pugging or Hummocking*** includes soil compaction caused by animal hooves. Indicators include either large humps in the soil where vegetation has begun to dry out and soil begins to erode (hummocking) or patches of bare ground where extreme trampling has stomped out all vegetation (pugging). Please consider the percent of the wetland containing pugs or hummocks and then evaluate the degree to which the area has been affected. The scores vary from slight to severe. ***Slight*** impact would be when the pugging or hummocking is minimal or shallow or when hummocking has occurred, but vegetation and bank stability is intact or recovering. ***Moderate*** would be when pugging is minimal, hummocks are deep, and the wetland is beginning to dry out. ***Severe*** would be when hummocks are deep, pugging is common and vegetation is mostly dead or absent.

Hydrogeomorphology Condition Index: For hydrologic disturbance take the sum of the two lowest scores (3.1-3.4) and divide by 20.

If the wetland is a riverine site take the average of the hydrogeomorphology condition index score and the Riverine Index score (next section).

Hydrogeomorphology - Riverine (Form Sections 3.5 – 3.10)

The rest of the Hydrogeomorphology Condition section refers to HGM riverine sites only. Skip to the Hydrogeomorphic Index if not assessing a riverine site. If the site is riverine, the following directions apply.

For the next portion of the form we incorporated a modified version of the *riparian assessment form and guidelines* that were developed by NRCS (2004 NRCS). ***For additional information please review the NRCS guidelines at*** http://www.mt.nrcs.usda.gov/technical/ecs/environment/technotes/.

The NRCS questions that are used in this section of the form are the ones that focus on hydrogeomorphology. In order to use a Personal Data Assistant (PDA), the questions used within the DEQ rapid assessment form are a shorter version than were originally developed by NRCS and used by the DEQ TMDL Program for assessing stream riparian corridor conditions. Therefore, the portions of the NRCS riparian assessment form questions that were omitted from the DEQ rapid assessment form are provided within this guidance document *(in italics)* and should be used as additional guidance.

The NRCS riparian assessment questions follow concepts that are based on Proper Functioning Condition (PFC), which is a qualitative method for assessing the condition of riparian-wetland areas. The term PFC is used to describe both the assessment process, and a defined on the-ground condition of a riparian-wetland area. The questions are used to evaluate how well a riparian-wetland area will hold together during high flow events which allows the area to provide fish and wildlife habitats and support greater biodiversity, filter nutrients and sediment and improve water quality, dissipate stream energy thereby reducing erosion, improve flood water retention and ground-water recharge, etc.

The following questions focus on evaluating how well the physical processes are functioning by assessing stream hydrogeomorphic attributes to evaluate riparian-wetland conditions. For example, stream channel incisement impacts riparian-wetland areas by reducing inundation, which is necessary for supporting wetland vegetation. Another example is excessive stream channel lateral cutting, which either indicates that a riparian-wetland area has been degraded and is becoming unstable or that the stream system has excessive energy that is eroding the riparian area. In either situation, stream channel lateral cutting is a useful indicator for assessing the condition of the riparian-wetland areas.

The riverine questions are used to evaluate the attributes and processes for riparian-wetland area sustainability and are interrelated. Therefore all of the questions must be answered to conduct the assessment. For example, if the channel incisement question has a low score, then some of the other questions are likely to score low as well.

Instructions and supporting information from the NRCS Riparian Assessment Guidance are provided for each rating criterion. ***Please also use the NRCS Riparian Assessment Guidance for additional information.***

Comments: Provide the rational for low scores, including comments regarding potential and actual characteristics.

3.5 Stream Incisement (Downcutting). The intent of this question is to evaluate whether a stream has incised or is currently in the process of incising. This becomes a critical threshold for management of treatment. Early detection and stopping the process of downcutting a stream system is often cheaper and usually more successful than trying to treat an area that has downcut and has to go through recovery. ***For more information please review question 1 in the NRCS Riparian Assessment Guidebook.***

SCORING:

8 = channel stable, *no active downcutting occurring; or, old downcutting apparent but a new, stable riparian area has formed within the incised channel. There is perennial riparian vegetation well established in the riparian area. (Stage 1 and 5, Schumm's model; NRCS Riparian Assessment Guidebook).*
6 = channel has evidence of old downcutting that has begun stabilizing; *vegetation is beginning to establish, even at the base of the falling banks, soil disturbance evident. (Stage 4 Schumm's model; NRCS Riparian Assessment Guidebook).*
4 = small headcut, in early stage, is present. Channel is in beginning stages of unraveling. *Immediate action may prevent further degradation. (Early Stage 2, Schumm's mode; NRCS Riparian Assessment Guidebook).*
2 = unstable, channel incised, actively widening, *limited new riparian area/floodplain, floodplain not well vegetated. The vegetation that is present is mainly pioneer species.* Bank failure is common. *(Stage 3, Schumm's model; NRCS Riparian Assessment Guidebook).*
0 = channel deeply incised, resembling a gully, *little or no riparian area, active downcutting is clearly occurring. Only occasional or rare flood events access the flood plain. Tributaries will also exhibit downcutting or signs of downcutting. (Stage 2, Schumm's model; NRCS Riparian Assessment Guidebook).*

3.6 Percent of Streambanks with Excessive Lateral Cutting: This question deals with all lateral erosion occurring within the channel. The intent of this question is to evaluate current lateral stability in relation to potential stability for the specific stream type. ***For more information please review question 2 in the NRCS Riparian Assessment Guidebook.***

SCORING: (inspect banks on both sides of the stream)

8 = lateral bank erosion is in balance with the stream and its setting–*less than 5% of streambanks in the reach show management-induced lateral erosion.*
5 = there is a minimal amount of human-induced, active lateral bank erosion occurring, primarily limited to outside banks–*5-10% of the streambanks show management-induced lateral erosion.*
3= there is a moderate amount of human-induced active lateral bank erosion on either or both outside or inside banks–*11-15% of the streambanks show management-induced lateral erosion.*
0 = there is extensive human-induced active lateral bank erosion occurring on outside and inside banks and straight sections- *greater than 15% of the streambanks show management-induced lateral erosion*.

3.7 ***The Stream is in Balance with the Water and Sediment Supplied by the Watershed:***
The intent of this question is to identify those stream channels that are not in balance and are aggrading or have excess sediment or bedload as evidenced by significant deposits of material within the channel. Excess sediment often results in widening and the formation of islands and mid-channel bars and leads to development of a braided stream. ***For more information please review question 3 in the NRCS Riparian Assessment Guidebook.***

SCORING:

6 = No evidence of excessive sediment removal or disposition, or that the stream is getting wider. *The stream tends to be narrow and deep. There are no indications that the stream is widening or getting shallower. There may be some well-washed gravel and cobble bars present. Pools are common (B and naturally occurring D channel types are exceptions).*
4 = The stream has widened and/or become shallower due to unstable banks or dewatering, *which reduces the amount of water and energy needed to effectively move the sediment through the channel (note sediment sources may also be from offsite sources).* Point bars are often enlarged by gravel with silt and sand common, *and new bars are forming. Pools are common, but may be shallow (B and naturally occurring D channel types are exceptions).*
2 = The stream tends to be very wide and shallow. *Point bars are enlarged by gravel with abundant sand and silt, and new bars are forming that often force lateral movement of the stream.* Mid channel bars are often present. *For prairie streams there is often a deep layer of sediment on top of the gravel substrate. The frequency of pools is low (B and naturally occurring D channel types are exceptions).*
0= The stream has poor sediment transport *which is reflected by poor channel definition*. The channel is often braided having at least 3 active channels *(Naturally occurring D channels types are exceptions). Pools are filled with sediment or are not existent.*

3.8 Riverine Area/Floodplain Characteristics: The basic intent of this question is to determine if appropriate floodplain characteristics are present and functioning to dissipate energy and capture sediment and to determine the level of stability or risk. ***For more information please review question 10 in the NRCS Riparian Assessment Guidebook.***

SCORING:

8 = Little evidence of floodplain erosion. *The floodplain is readily accessed during average high-flow events (2-year flood event). Bankfull elevation and floodplain elevation are near the same. Active flood or overflow channels exist in the riparian/floodplain. Large rock and woody debris are common within the active channel to adequately dissipate stream energy and trap sediment. Riparian vegetation is near potential for the reach. There is little evidence of excessive erosion or disturbance which reduces energy dissipation and sediment capture on the adjacent floodplain/riparian area. There are no headcuts where either overland flow and/or flood channel flows return to the main channel.*

6 = Floodplain Erosion not extensive. *The floodplain meets the characteristics of the description in 8 above, but demonstrates slight limitations in the kind and amount of large rock or woody debris present. Riparian vegetation structure is below that required to dissipate energy. There may be occasional evidence of surface erosion and disturbance, but generally not extensive enough to have affected channel development.*

4 = Considerable evidence of floodplain erosion and occasional headcuts. *The floodplain is accessed, but only during very high flow events (> 10-year flood event). Rock and/or woody material is present, but generally of insufficient size to fully dissipate stream energy. Some sediment is being captured. Evidence of incipient erosion and/or headcuts is readily present.*

2 = Erosion and Headcuts within the floodplain are extensive. *Some Human-caused stream bank erosion is occurring. Inadequate rock and/or woody material available for dissipation of energy or sediment capture. There is some streambank erosion due to human disturbance, and occasional headcuts where overland flows or flood channel flows return to the main channel.*

0 = The floodplain is very limited or does not exist. *Stream bank and/or floodplain erosion is common. Riparian/floodplain areas reflect the following conditions: 1) the floodplain is seldom accessed during any high flow event, 2) flood or overflow channels do not exist, and 3) large rock or woody debris is not present in the active channel for energy dissipation and sediment trapping. Streambank and/or floodplain erosion and/or evidence of human alteration is common. G- and F-type channels (Rosgen) would typically reflect these conditions.*

3.*9 Riverine-Streambank with Vegetation (kind) Having a Deep Binding Rootmass:*
The intent of this question is to determine whether the kinds of plants present along both stream banks have root systems capable of binding soil particles together so the bank is protected from erosion. Plants with deep, binding, root systems also add to the functionality of a system by their ability to trap sediment, hold moisture in the soil, and reduce some of the erosive energy of the stream. For this question, all native, woody riparian plants are considered to have deep, binding root systems. Most perennial native riparian grasses and sedges also have deep, binding root systems.

Riparian areas dominated by shallow rooted annuals and introduced perennials such as Kentucky bluegrass, smooth brome, "Garrison" creeping foxtail, or redtop should receive a lower score. ***For more information please review question 4 in the NRCS Riparian Assessment Guidebook.*** Please see Appendix 3 within the NRCS Riparian Assessment form to determine the stability ratings of most plants.

SCORING:
6 = The streambank vegetative communities are comprised of at least four plant species with deep binding root masses.
4 = The streambank vegetative communities are comprised of at least three plant species with deep, binding root masses.
2 = The streambank vegetative communities are comprised of at least two plant species with deep binding root masses.
0 = The streambank vegetative communities are comprised of one or no plant species with deep binding root masses.

3.10 *Streambank with Vegetation (Amount) having a Deep, Binding Rootmass:*
While Question 3.9 asks about the kinds of plants that are present, the intent of this question is to determine whether there is sufficient (amount or quantity) effective cover of native plants for the riparian area and active floodplain to either recover or maintain its sustainability and function. ***For more information please review question 5 in the NRCS Riparian Assessment Guidebook.***

SCORING:
6 = More than 85% of the floodplain has vegetation with a stability rating greater than or equal to 6.
4 =75%-85% of the floodplain has vegetation with a stability rating greater than or equal to 6.
2 =65%-75% of the floodplain has vegetation with a stability rating greater than or equal to 6.
0 = less than 65% of the floodplain has vegetation with a stability rating greater than or equal to 6.

Riverine Index: Sum the actual scores (3.5-3.10) and divide by the sum of the potential scores (usually maximum scores): if the potential is not at the maximum score explain in the area provided on the form. Combine the riverine Index with the Hydrogeomorphic Condition Index (See Hydrogeomorphic Condition index - Sections 3.1-3.4).

Vegetation Condition (Form Section 4.0)

Vegetation provides a sensitive measure of impacts to wetland ecosystems that respond to physical and hydrologic alterations and changes in water quality (USEPA 2002). As such, vegetation communities can serve as a means to evaluate land management activities, prioritize wetland-related resource management decisions, and for assessing aquatic life uses for wetlands. Wetland vegetation is the base of the food chain and, as such, is a primary pathway of energy flow in the system. Vegetation also provides critical habitat structure for a variety of wildlife, including amphibians, fish, birds and mammals.

For the next portion of the form we included questions from the riparian assessment form and guidelines that were developed by NRCS (2004 NRCS). Therefore, the NRCS Riparian Assessment Guidebook questions 6-9 should be reviewed for additional guidance (please see http://www.mt.nrcs.usda.gov/technical/ecs/environment/technotes/ for more information).

The NRCS questions that are used in this section of the form focus on vegetation condition. Shorter versions of the NRCS questions were developed for wetland rapid assessment form with the intention that they could later be use in a PDA. The portions of the questions in this guidebook that are in italics are from the NRCS riparian assessment form and should be used as additional guidance for answering the questions on this form. In addition, the scoring of the NRCS questions have been modified for this form in order to assess ecological integrity (wetland condition) instead of the sustainability of the riparian corridor and stream channel, which is the purpose of the NRCS form. The reason for doing this is because riparian-wetland areas can function properly and are sustainable before they achieve their potential (i.e., biological integrity).

4.1 ***Bare Ground:*** If the vegetation is absent and soils are exposed due to a human-caused disturbance (e.g., cattle have trampled the vegetation), then note the degree to which the wetland is affected.

4.2 Invasive and ***Disturbance-caused Undesirable Plants:*** Score according to the percent coverage or abundance of disturbance-caused vegetations in the wetland area. Rank the three most abundant invasive and disturbance-caused plants observed. Check all other undesirable plants that were observed. Exotic, undesirable species to be considered for this question typically are less adapted to wet conditions but can be aggressive invaders in riparian areas where they eventually crowd out a significant percentage of the native plant community. The introduction and spread of these plants is often caused by a disturbance that may include heavy livestock grazing use, excessive wildlife browse, riparian clearing, urban development, and channel incisement. While some of these plants function to retain sediment and provide effective ground cover, their presence is a concern because they usually limit the attainment of other important wetland functions such as wildlife habitat and forage production. ***For more information please review question 7 in the NRCS Riparian Assessment Guidebook. Also see wetland rapid assessment photo key (Attachment A).***

4.3 ***Noxious Weeds:*** *S*core according to the percent coverage or abundance of noxious weed in the wetland area. Rank the three most abundant noxious weeds observed. Check all other noxious weeds that were observed. The presence of noxious weeds indicates a downward trend in ecological condition and riparian health. The long-term implications of noxious weed infestation are the crowding out of native plant communities. As weed infestations spread, this will lead to the eventually instability of both the biological (biodiversity and habitat) and physical (e.g., stream bank stability) health of the wetland. Infestations of noxious weeds pose significant short-term and long-term economic impacts. The intent of this question is to quantify and score the extent of noxious weed infestations in the wetland-riparian area. ***For more information please review question 6 in the NRCS Riparian Assessment Guidebook.*** Please refer to Appendix B for noxious weed descriptions and photos.

Potential for Woody Species

When evaluating the woody vegetation, potential and capability must be considered. Many wetlands and riparian areas, for example, are expected to have cottonwood trees or willows present. However, because of a hydrologic modifier (e.g., dam) the flood events and other site conditions needed for reestablishment no longer exist and the *capability* of the wetland does not include the establishment of cottonwoods and willow. Also, many wetland types do not have the *potential* for shrubs due to natural limitations (e.g. fluctuating hydroperiod, saturated soils or high salinity).

The rest of this section can be skipped if the site does not have the potential for shrubs or trees. Note: Potential is addressing whether shrubs or trees may have existed or could exist if the site had not (or is not currently) impacted by human stressors. For example, would shrubs be present if grazing was less intense? Often one can determine that a wetland has the potential for woody species, by observing evidence of old remnant trees and shrubs.

4.4 Woody Species Establishment:

The intent of this question is to determine if multiple age-classes of native woody species are present, reflecting the potential of the site for maintenance and/or recovery. For many wetlands and riparian areas, woody species are an important component and are often largely responsible for sustainability and function. The presence of all age classes indicates a generally healthy condition and ecological diversity. Such areas will have natural resistance to impacts such as disease and insects, and will exhibit a resiliency to other disturbances. ***For more information please review question 8 in the NRCS Riparian Assessment Guidebook.***

SCORING:

10 = all age classes of desirable woody riparian species present

6 = one age class of desirable woody riparian species is clearly absent, all others well represented. Often, it will be the middle age group(s) that are absent. *Having mature individuals and at least one younger age class present indicates the potential for recovery.*

4 = two age classes (seedlings and saplings) of native riparian shrubs and/or two age classes of native riparian trees are clearly absent, or the stand is comprised of mainly mature species. Other age classes well represented.

2 = disturbance induced, (i.e., facultative, facultative upland species such as rose, or snowberry) or non-riparian species dominate. Woody species present consist of decadent/dying individuals.

0 = a few woody species are present (<10% canopy cover), but herbaceous species dominate (at this point, the site potential should be re-evaluated to ensure that it has potential for woody vegetation). OR, the site has at ≥ 5% canopy cover of Russian olive and/or salt cedar. *On sites with long-term manipulation or disturbance, woody species potential is easily underestimated.*

4.5 Utilization of Trees and Shrubs:
The intent of this question is to determine if the degree of use and/or mechanical damage of the woody plants on a site is severe enough to limit their potential for recovery or maintenance of the wetland-riparian area. Generally, if there is much browsing of shrubs and trees where the older growth is consumed; there will be an eventual change in growth form. Such plants develop either a "highlined" or a "clubbed" appearance. Physical trampling and rubbing of shrubs and trees can also create "umbrella-shaped" specimens with the lowermost limbs removed. ***Please review question 9 in the NRCS Riparian Assessment Guidebook for additional information. Also see (Kiegley and Frissina 1998)*** http://www.habitat4wildlife.net/browse_evaluation.htm.

SCORING:

10 = Few to none of the available second year and older stems are browsed. *0-5% of the available second year and older stems are browsed.*
8 = Second year and older stems are lightly browsed. *5%-25% of the available second year and older stems are browsed (lightly).*
6 = Second year and older stems are moderately browsed. *25%-50% of the available second year and older stems are browsed (moderately).*
2 = Second year and older stems are heavily browsed. Many of the shrubs have either a "clubbed" growth form, or they are high-lined or umbrella shaped. *More than 50% of the available second year and older stems are browsed (heavily).*
0 = there is noticeable use (10% or more) of unpalatable and normally unused woody species.

4.6 ***Percent of Physical Removal of Tree/Shrub layer or dead wood:***
Physical removal includes trees or shrubs that are physically beaten down or removed by human-caused disturbances. This many include: excavation, cattle trampling, etc. The observation of dead wood is accounting for trees or shrubs that are dead possibly due to dewatering, flooding, over grazing, etc. Do not account for dead wood that is caused by flooding from beaver dams.

Vegetation Condition Index
For sites with only herbaceous vegetation sum all of the points (4.1-4.3) and divide by 30. For sites with woody species divide the result for each question (4.1-4.3 and 4.6) by 10 and divide the actual score by the potential score for questions 4.4 and 4.5. Sum all of the points and divide by 6. If any score of the individual questions are less than 6 provide comments in the section provided.

Water Quality Condition (Form Section 5.0)

Wetland water quality is often impacted by adjacent land use activities. Vegetation has a strong link with water chemistry and responds to nutrients, metals and other contaminants. Excessive pollutants may cause the growth of undesirable aquatic plants (e.g. noxious algae or cattails) or may have a toxic effect (e.g. saline seeps or metals). Excessive erosion can fill in a wetland to a level where it no longer provides habitat for aquatic life.

5.1 ***Algae or Duckweed:*** Circle the points corresponding to the current condition, choosing only one option in this column. Algae and duckweed growth is often an indicator of an over abundance of nutrients in the water. Large patches of algae or duckweed would cover at least 50 percent of the standing water.
5.2 ***Cattails:*** Check "Yes" if the wetland is dominated by cattails. If the wetland is dominated by cattails (creating a monoculture) that would mean at least 70% of vegetated area (not open water) is inhabited by the species. Monoculture cattail stands are often caused by excessive nutrients.
5.3 ***Sediment and Turbidity:*** Score according to the amount of sediment in the wetland and then according to the turbidity of the water. Take the average of those two scores and circle a final score representing both indicators.
5.4 ***Surface oils and Foams:*** Circle the points corresponding to the current condition, choosing only one option in this column. Do not consider sheen from rotting vegetation. There should be evidence of a source of pollution if pollutant oils are present.
5.5 ***Toxics:*** Circle the best description. Evidence of toxics could include the color of the water (e.g., orange), odd odor, or obvious point source pollution. If aquatic life is not observed, it may indicate the presence of toxics.
5.6 Salinity: Circle the best description. Impacts from salinity would be difficult to determine unless a saline seep or fallow cropland are observed in the surrounding area. If such observations have been made circle "Yes" and score according to the severity of your observations and document what the observations are. Salinity impacts can be more accurately evaluated by using a conductivity meter. If you have a conductivity meter score according to actual conductivity measurements while also considering the occurrence of saline seeps, oil bines or fallow cropland in the surrounding area.

Water Quality Index: Take the sum of the lowest two scores (5.1-5.6) and divide by 20. Comment on any impacts for a score less than six in the section provided.

Buffer Condition / Degree of Stress (Form Section 6.0)

The buffer is the100 meter area surrounding the wetland. This section is designed to rate indicators (stressors) within the buffer that are likely to impact the wetland. The buffer condition / stressor index is used to calculate the overall score and is compared to the wetland impacts score to help determine if there are any relationships between the stressors that were observed in the buffer and the impacts that were observed in the wetland.

More Extensive Category Descriptions:

None Present: No potential stressor observed in the buffer.
Very Few Present/Minimal: The occurrence of potential stressors in the buffer is very small. Stressor may be present in only one very small area of the buffer.
Some Present: Stressors have widespread occurrences within the buffer area. There may be numerous patches of bare ground, weeds or other undesirable plants. The stressors are present in the buffer but the percent coverage is not that large.
Very Apparent and Extensive Distribution: Areas of bare ground are large and numerous. Noxious weeds and disturbance plants are also abundant, covering a large percent of the buffer area.

6.1 ***Bare Ground*****:** Score according to the amount of bare ground (see above). It is important to observe bare ground in the buffer as the absence of vegetation. This indicates instability and source of sediment. First, choose the amount of bare ground that is evident and then score according to the average slope of the buffer area. If there is "none present" or "very few," then the slope is not crucial to the scoring. Noting the slope of the area is an indicator of potential soil instability (threat of erosion, etc.) For estimating on slope please use the descriptions of the categories in the margin to the right.
6.2 ***Noxious Weeds:*** Score according to the abundance of the noxious weeds observed (see above). Use the Montana Noxious Weed Pamphlet(s) to help identify the weeds that are located in the buffer. Please refer to Appendix B for links to Montana weed lists, descriptions and photos.
6.3 ***Disturbance Caused Undesirable Plants:*** These are scored similarly as the noxious weeds. These plants are usually nonnative species and indicate disturbance. See list of disturbance-caused undesirable plants listed in Section 4.2 (Vegetation Condition).
6.4 ***Grazing Intensity:*** First consider the intensity of grazing (i.e., slight, moderate, severe) and then score according to the degree of slope.
6.5 ***Recreational Activities:*** Consider how much use the buffer area is being used for recreation or is currently being occupied by recreational facilities. Examples include fishing access areas, campgrounds and hiking trails.
6.6 ***Hayfields:*** Score according to the percent of the buffer occupied by hayfields.
6.7 ***Row Crops:*** Score according to what percent of the buffer is being occupied by row crops. Consider the slope of the land if row crops occupy more than 5 percent of the buffer. Slope is important for determining the increased risk of excessive nutrients and sediment entering the wetland during runoff.

6.8 Clearcuts: Score according to the percent of the buffer occupied by clearcuts. The removal of trees adjacent to a wetland increases the risk of nutrients and sediment entering the wetland during runoff. Note what percent of the buffer area has been recently clearcut. Indicators of a recent clear cut include large open areas with logging roads and tree stumps or one age class of small trees.
6.9 Feedlot/concentrated livestock: Score according to what percent of the buffer is being occupied by concentrated livestock operations. A feedlot that is located in the buffer area will likely contribute excessive nutrients and sediment to the wetland.
6.10 Residential development: Score this section on the percent of the buffer occupied by residential development.
6.11 Human-constructed Dams or Dikes: Score according to whether a dike or dam is present. These constructions alter surface and sub surface water flow and are indicators of an unnatural wetland.
6.12 Human Induced Saline Seeps: Score according to the percent of buffer occupied by saline seeps. Saline seeps are often caused by fallow croplands and are likely to negatively impact the aquatic life that are living in the wetland by increasing the amount of salinity, selenium and nitrogen.
6.13 Industrial or Commercial activities: Score according to the percent of buffer occupied. This includes active mining or mine tailings in the buffer area.
6.14 Oil and Gas Development: Score according to the percent of buffer occupied.
6.15 Stressors Within 100-500 meters of Wetland: Please circle any of the listed stressors that are observed within 500 meters of the wetland. This section is designed to assess potential stressors within the greater wetland area and is primarily used for future investigations. Further assessment should also include the use of a landscape level assessment (Level 1).
6.16-21 Roads: Identify any roads that are near the wetland and score according to their proximity and slope in relation to the wetland. Roads that are upslope from a wetland pose a greater threat to the condition of the wetland.

Buffer Condition / Stressor Index: Sum the four lowest scores circled and divide by the total possible for the assessment area (40).

Restorability (Form Section 7.0)

We designed this portion of the form for identifying the effort needed for restoring the wetland and for determining if the wetland condition appears to be improving or getting worse (trending upward or downward).

Generally, expense and effort are two criteria for determining restorability. Indicators such as the regeneration of willows or the narrowing of a stream channel or a recent change in land use (e.g., fencing out cattle or closing a road) are often used for determining upward trends. Dying mature woody vegetation, an infestation of noxious weeds, or the widening of a stream channel or headcutting are often used as indicators of a declining trend.

Circle the category and sub category that best fits the wetland area. This section is designed to identify the time and effort that it would take to improve the condition of a wetland. These questions were designed to evaluate the "capability" for restoration. For example, in some cases restoration would be relatively easy (building a fence), but in other cases the impacts to the wetland may be too costly or severe to ever recover (removing a highway or dam), and the wetland should only be restored to meet its *capability*.

7.1 Restoration: Choose the category in which the comments best address the wetland condition and the level of effort needed to restore the wetland.
7.2 Trends: Chose a subcategory that best describes the trend of the wetland condition. If the trend cannot be determined with a reasonable level of confidence then subcategory four is advised. Please provide comments that describe the indicators that were used when observations are made that the wetland condition is trending upward or downward.

Summary of Rating

It is not necessary to calculate any of the scores on the last page. The Hydrogeomorphic, Vegetation, Water Quality and Buffer Condition/Stressor scores are automatically calculated when the data are entered into DEQ's database.

Wetland Impacts Score

The impact scores do not include the buffer condition /stressors index in the calculation. Rather the impact score is compared to the buffer condition/stressor index to help determine if there are any cause and effect relationships. Such as, are wetlands being impacted when the buffer condition/stressor score is low due the presence of a high level of human-caused activities or impacts in the surrounding buffer area? The impact score is automatically calculated when the data are entered into DEQ's database. The following calculations are for the wetland impact score.

Surface Water Present:

1) Multiply the Hydrogeomorphic Condition Index (found at the end of section 3.0) by 0.4 and write this value in the appropriate box.
2) Multiply the value of the Vegetation Condition Index (found at the end of section 4.0) by 0.4 in the appropriate box.
3) Multiply the Water Quality Condition Index (found at the end of section 5.0) by 0.2 and write this value in the appropriate box.

4) Sum the three values found in steps 1-3 and write this value in the wetland impact score box.

No Surface Water Present:

1) Multiply the Hydrogeomorphic Condition Index (found at the end of section two) by 0.5 and write this value in the appropriate box.
2) Multiply the value of the Vegetation Condition Index (found at the end of section three) by 0.5 and write this value in the appropriate box.
3) Sum the two values in steps 1-2 and write this value in the wetland impact score box.

Overall Score

The Overall score is computed using the Hydrogeomorphic Condition Index, Vegetation Condition Index, Water Quality Condition Index, and the Buffer Condition / Stressor Index and is dependant on whether or not surface water exists at the site. The overall score is automatically calculated when the data are entered into DEQ's database. The following calculations are for the overall score:

Surface Water Present:

1) Multiply the Hydrogeomorphic Condition Index (found at the end of Section 3.0) by 0.3 and write this value in the appropriate box.
2) 2) Multiply the value of the Vegetation Condition Index (found at the end of Section 4.0) by 0.3 in the appropriate box.

3) 3) Multiply the Water Quality Condition Index (found at the end of Section 5.0) by 0.2 and write this value in the appropriate box.
4) 4) Multiply the Buffer Condition Index (found at the end of Section 6.0) by 0.2 and write this value in the appropriate box.
5) 5) Sum the four values found in steps 1-4 and write this value in the overall score box.

No Surface Water Present:

1) Multiply the Hydrogeomorphic Condition Index (found at the end of Section 2.0) by 0.4 and write this value in the appropriate box.
2) 2) Multiply the value of the Vegetation Condition Index (found at the end of Section 3.0) by 0.4 and write this value in the appropriate box.
3) 3) Multiply the Buffer Condition Index (found at the end of Section 5.0) by 0.2 and write this value in the appropriate box.
4) Sum the three values found in steps 1-3 and write this value in the overall score box.

Rank Stressors

Use your best judgment to rank all of the stressors that were observed within or near the wetland. This information will be used to help determine where stressors are occurring within a watershed or region.

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APPENDICES

Appendix A: Riparian Assessment using NRCS Riparian Assessment Method.
http://www.mt.nrcs.usda.gov/technical/ecs/environment/technotes/

Appendix B: Montana Noxious Weed Lists
http://www.agr.state.mt.us/weedpest/noxiousweeds.asp
http://www.montana.edu/wwwpb/pubs/eb159.html
http://www.mtweed.org/Identification/identification.html

ATTACHMENTS

Attachment A: Wetland Rapid Assessment Photo Key
Photo Key for Amphibian and Reptile Species
Photo Key for Browse Evaluation
Photo Key for Site Condition Examples
Photo Key Hydrogeomorphology Section
Photo Key Stressor Section
Photo Key Vegetation Species

Attachment B: Montana Wetland Rapid Assessment Form
Montana Wetland Rapid Assessment Form (Version 2)